A Watershed Conditions Report For the State of Kansas
HUC 10260012
(LOWER NORTH FORK SOLOMON) Watershed

Solomon River, Photograph courtesy of The Kansas Department of Agriculture www.ink.org/public/kda/

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Watershed Conditions Report
For
HUC 10260012 (LOWER NORTH FORK SOLOMON)

Prepared by
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Nonpoint Source Section
12/6/01

EXECUTIVE SUMMARY

This Watershed Conditions Report is designed to serve as a water quality "atlas", and is intended to provide stakeholders in water quality with a tool to assess the condition of water resources within their watershed. Surface water quality for HUC 8 10260012 streams and rivers is generally fair with over half of the surface water bodies not supporting their designated uses. The primary pollutant concern within HUC 8 10260012 streams and rivers is fecal coliform bacteria (FCB). FCB is a bacteria present in human and animal waste and serves as an indicator of potential disease causing organisms. Additional pollutants in this watershed are sulfate, selenium and ammonia. Sulfate is a naturally occurring mineral that is dissolved by water. Selenium is a naturally occurring inorganic material, which may have toxic effects on humans at high concentrations. Ammonia is a chemical toxic to fish and aquatic organisms.

There are several small lakes within HUC 8 10260012. Currently, the Francis Wachs wetland area is the only lake/wetland area within this watershed that is monitored by KDHE. This monitoring site has not identified any threatening pollutant thus far.

Groundwater resources in HUC 8 10260012 include the alluvial aquifers of the Solomon River and it's tributaries and portions of the High Plains and Dakota aquifers. Water from these aquifers is generally in good condition with naturally occurring minerals, chloride and sodium primary pollutant concerns.

PURPOSE

The Watershed Conditions Report is designed to serve as a water quality "atlas" for a given watershed, and is intended to provide Watershed Stakeholders Committees (WSC) with a tool to assess the condition of water resources within their watershed.

BACKGROUND

The Clean Water Act mandates that States assess the quality of their waters and implement Total Maximum Daily Loads (TMDLs) for water bodies that do not meet their designated uses. The following is a summary of steps taken by the State of Kansas to comply with these requirements of the Clean Water Act.

The Kansas Department of Health and Environment (KDHE) prepared the Kansas Unified Watershed Assessment in 1998. This assessment classifies the State's watersheds into four categories. A Category I classification means the watershed is in need of restoration due to having water quality impairments or degradation of other natural resources related to an aquatic habitat, ecosystem health and other factors related to aquatic life resources. Category II watersheds are in need of protection. Category III are watersheds with pristine or sensitive aquatic system conditions on lands administered by federal, state, or tribal governments. Category IV watersheds are those for which there is insufficient data to make accurate classification. KDHE has assigned a restoration priority score to each Category I watershed.

As mandated by section 303(d) of the Clean Water Act, lakes and streams within the Category I watersheds, which do not meet water quality standards, are published biannually in the 303(d) list. Subsequently, lakes and streams which appear on the 303 (d) list are scheduled to have a Total Maximum Daily Load (TMDL) prepared. KDHE is currently preparing TMDLs for impaired stream segments located within the highest restoration priority watersheds.

To restore water quality within the Category I watersheds, KDHE recommends the implementation of a Watershed Restoration and Protection Strategy (WRAPS). The ultimate goal of the WRAPS process is to create and implement a plan to restore the health of water bodies that do not meet their water quality standards. Additionally, the WRAPS process will insure that water bodies that currently meet their water quality standards are protected.

KDHE recommends that the WRAPS process be implemented on a local level by a Watershed Stakeholders Committee (WSC). The WSC would have the responsibility of working with local and state agencies to develop a WRAPS plan. This plan should identify the following: public outreach methods; required monitoring activities based on water quality goals and outcomes; specific water quality problems; watershed coordinator/evaluator; actions to be taken to achieve water quality goals and outcomes; schedule for implementation of needed restoration measures; and funding needs.

Streams and Rivers

HUC 8 10260012

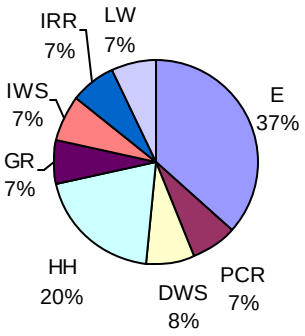
The Huc 8 10260012 watershed is ranked thirty-fourth in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, 56.8% of the total miles of water in this watershed do not meet their designated uses. This watershed encompasses the Solomon River and several other creeks and streams. See Attachment 1 for a map of streams and rivers in HUC 8 10260012.

Designated Uses

This watershed is primarily a drainage basin for Solomon River and its tributaries. Surface waters in this watershed are generally used for aquatic life support, human health, domestic water supply and primary contact recreation. There are 53 public water supplies within the watershed, many of which draw water from the Solomon River and it's alluvium.

Figure 1

Surface Water Uses



- HH=Human Health
- PCR=Designated for contact recreational use
- DWS=Designated for domestic water supply use
- GR=Designated for ground water recharge
- IRR=Designated for irrigation use
- IWS=Designated for industrial water supply use
- LW=Designated for livestock use
- E=Expected Aquatic Life
- R=Restricted Aquatic Life

TMDL/Contaminate Concerns

Streams and rivers throughout Kansas have been sub-divided into segments. By dividing the streams and rivers into segments they can be better analyzed and understood. A reach of river or stream may have segments which vary greatly in water quality, based on surrounding land uses. The figures below display the impairments of the streams and rivers based on the number of segments sampled.

Surface waters not meeting their designated uses will require total maximum daily loads (TMDLs). Figure 2 shows 59% of the stream/river segments sampled need TMDLs. Streams/river segments in this watershed are impaired by fecal coliform bacteria (FCB), sulfate (SULF), selenium (SELE), and ammonia (NH3). Approximately 56% of the sampled streams/river segments are impaired by FCB, 26% are impaired by selenium, 16% are impaired by sulfate and 2% are impaired by ammonia (Figure 3).

FCB is a bacteria present in human and animal waste and serves as an indicator of potential disease causing organisms. Additional pollutants in this watershed are sulfate, selenium and ammonia. Sulfate is a naturally occurring mineral that is dissolved by water. Selenium is a naturally occurring inorganic

material, which may have toxic effects on humans at high concentrations. Ammonia is a chemical toxic to fish and aquatic organisms.

Figure 2

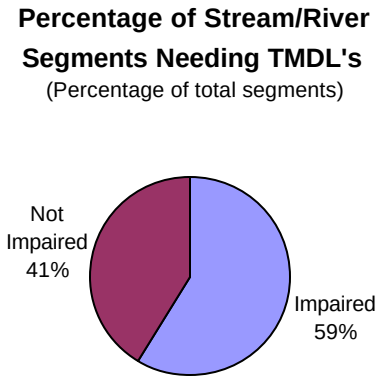
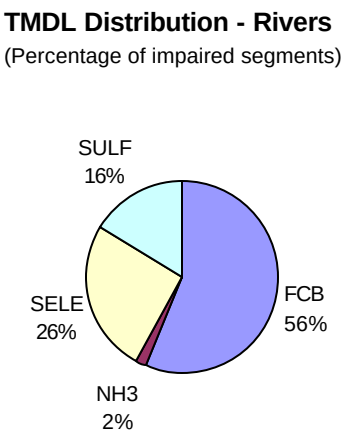


Figure 3



Potential Pollution Sources

Potential sources of FCB include feedlots, livestock, some older wastewater treatment facilities, septic systems, and wildlife. Sulfate concentrations may be increased by low flow of water into the watershed and irrigation. Potential sources of selenium include mining and low flow of water. Potential sources of ammonia include livestock, septic systems, wildlife, and wastewater facilities.

Land Use

Land use composition can have a significant affect on the types and quantity of nonpoint source pollutants in the watershed. Below are a list of the land uses in this watershed which can affect a stream or river segment. Grassland is considered grazingland for livestock.

- Urban Area…. 3.0%
- Row Crop…. 18.0%
- Grassland…. 79.0%
- Wooded Area…. 2.0%
- Water Area…. 0.1%
- Other…. 0.0%

Feedlots: In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. There are approximately 115 registered CAFOs located within HUC8 10260012 (this number, which is based on best available information, may be dated and subject to change). Waste disposal practices and wastewater effluent quality are closely monitored by KDHE for these registered CAFOs to determine the need for runoff control practices or structure. Because of this monitoring, registered CAFOs are not considered a significant threat to water resources within the watershed. A portion of the State's livestock population exists on small unregistered farms. These small unregistered livestock operations may contribute a significant source of fecal coliform bacteria and nutrients, depending on the presence and condition of waste management systems and proximity to water resources.

Wastewater Treatment Facilities: There are approximately 10 municipal and industrial wastewater treatment facilities within the watershed (this number may be dated and subject to change). These facilities are currently regulated by KDHE under National Pollutant Discharge Elimination System (NPDES) permits. These permits specify the maximum amount of pollutants allowed to be discharged to the "waters of the State". Due to the chlorination processes involved in municipal waste treatment, these facilities are not considered to be a significant source of fecal coliform bacteria; however they may be a significant source of nutrients.

Septic Systems: There are currently thousands of septic systems within the watershed and this number is increasing. When properly designed, installed, and maintained, septic systems can act as an effective means of wastewater treatment. However, poorly maintained or "failing" septic systems can leach pollutants into nearby surface waters and groundwater. The exact number of failing septic systems within the watershed is unknown; however the number may be increasing due to the current trends in suburban development. Local Environmental Protection Programs and County health departments may provide excellent sources of information regarding the proper design, installation, and maintenance for septic systems.

Wildlife: Wildlife located throughout the watershed are not usually considered a significant source of nonpoint source pollutants. However, during seasonal migrations, concentrations of waterfowl can add significant amounts of fecal coliform bacteria and nutrients into surface water resources.

Row Crop Agriculture: As stated above, approximately 18% of the watershed's land is used for row crop agriculture. Row crop agriculture can be a significant source of nonpoint source pollution. Common pollutants from row crop agriculture include sediment, nutrients, pesticides, and fecal coliform bacteria. Many producers within the watershed regularly implement and maintain BMPs to limit the amount of nonpoint source pollutants leaving their farm. Some common BMPs include: the use of contour plowing; use of cover crops; maintaining buffer strips along field edges; and proper timing of fertilizer application.

Urban/Suburban Runoff: Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is only about 3% urban. Limiting paved surfaces is the key to slowing urban nonpoint source pollution. The use of grass swales, open spaces, and storm water retention ponds are recommended to slow runoff in urban areas.

The watershed has an increasing population living in suburban areas. Residential landscapes are often designed with large turf areas which require high amounts of water and chemicals to maintain. The use of excessive amounts of fertilizers and lawn care chemicals in residential areas can contribute a significant amount of pollution to nearby water resources. Suburban nonpoint source pollution can be limited by: using less lawn fertilizers and chemicals; control of construction sites; proper disposal of pet waste; establishing large areas of native vegetation; and conserving the amount of water use for plant maintenance.

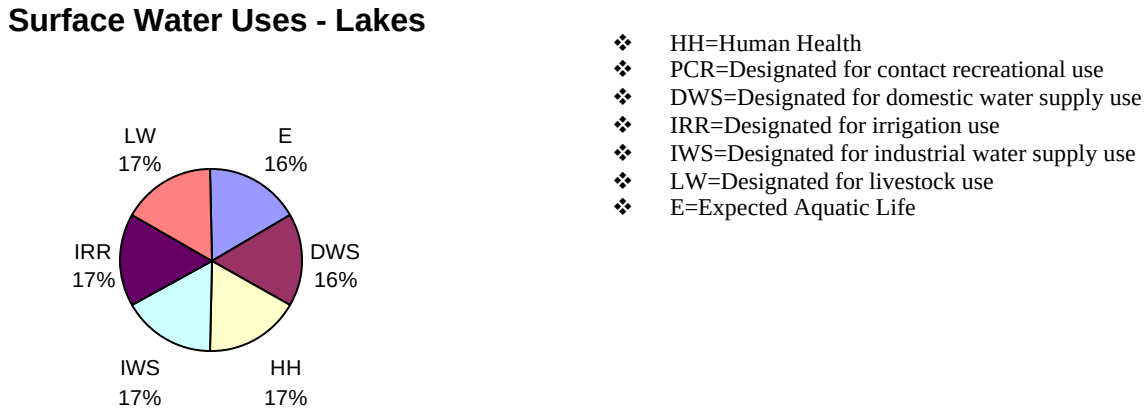
Lakes and Wetlands

Huc 8 10260012 is the home to Francis Wachs wetland area, the Waconda Lake and as several small city lakes and ponds. These lakes/wetland areas are used for recreational purposes as well as a public water supply source for many local communities. . See Attachment 2 for a map of lakes in HUC 8 10260012.

Designated Uses

According to the Surface Water Register, the Francis Wachs wetland area is designated for human health purposes, expected aquatic use, livestock watering, irrigation and domestic water supply.

Figure 4



TMDL/Contaminate Concerns

Due to the limited amount of surface water within this watershed, there is only one monitoring site. Currently there has been no detection of any threatening pollutants that impair this wetland area.

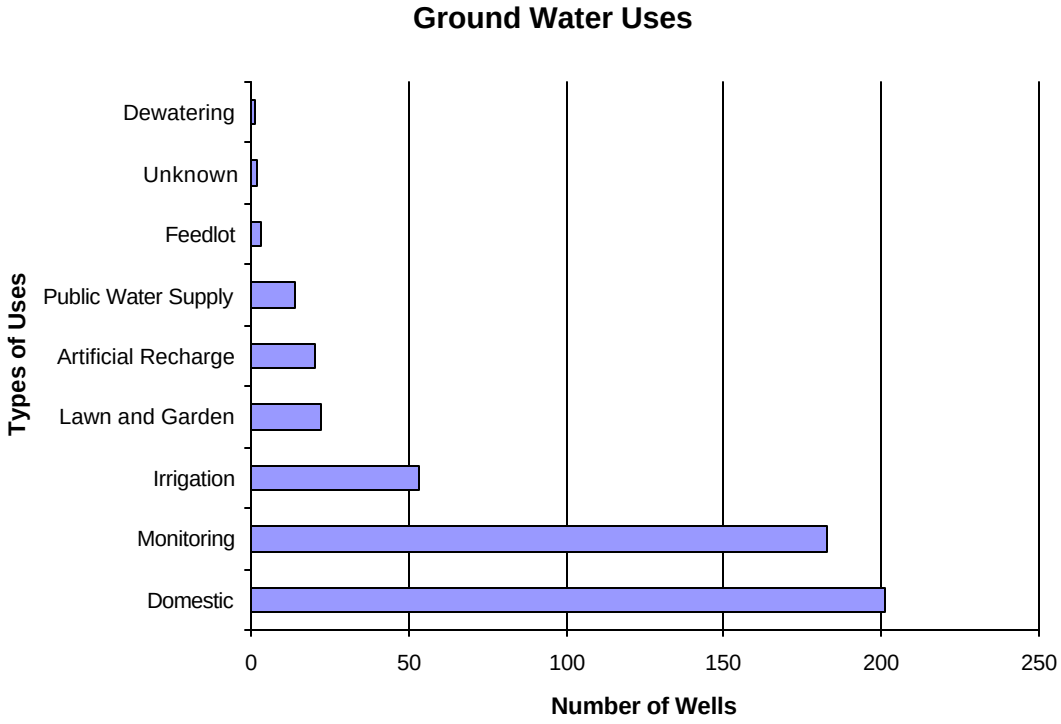
Groundwater

Major groundwater aquifers underlying this watershed include portions of the High Plains and Dakota Aquifers and alluvial aquifers of the Solomon River and it's tributaries found in the watershed. See attachment 4 for a map of groundwater aquifers within this watershed.

Designated Uses

There are approximately 499 groundwater wells located within the watershed. Water from these wells is used for domestic use, monitoring, irrigation, lawn and garden and several other uses as shown below (Figure 5).

Figure 5



Aquifer Characteristics

High Plains Aquifer: The High Plains aquifer underlies portions of this watershed. Water from this aquifer is often used for irrigation. This water is typically hard to very hard but in good condition with no dominating pollutants.

Dakota Aquifer: The Dakota aquifer underlies portions of this watershed.. Water from this aquifer is used primarily for irrigation, public use, and rural-domestic water supply. Water from this aquifer is good; however chloride and sodium content increase with depth.

Alluvial Aquifer: Alluvial aquifers of the Solomon River and it's tributaries exist throughout the watershed. Alluvial aquifers provide the primary water source for many public water supplies located with in the watershed. Water quality in alluvial aquifers is generally good; however nitrates, minerals, pesticides and bacteria can be pollutant concerns.

Potential Pollution Types and Sources

Common groundwater pollutants include: nitrates, chloride, sulfates, bacteria and atrazine. Nitrate impaired groundwater is perhaps the most prevalent groundwater contamination problem in the State.

Nitrate: Nitrate is a naturally occurring compound and is an essential component of all living matter. However, high concentrations of nitrate in drinking water can cause adverse health effects including "blue baby" syndrome. Sources of nitrate include municipal waste water treatment plant discharges, runoff

from livestock operations, leaching of fertilizer from urban and agricultural areas, and failing septic systems.

Chloride: Chloride is a naturally occurring mineral found in Kansas lakes, streams, and groundwater. In high concentrations, chloride can cause deterioration of domestic plumbing, water heaters, and municipal water works. The primary source of chloride impacted groundwater is intrusion of salt water from deeper formations, often due to improperly constructed water wells which allow confined aquifers to come into contact with each other.

Sulfates: Sulfate is a naturally occurring mineral that can cause taste and odor problems in drinking water. Sulfates are dissolved into groundwater as the water moves through various sulfur containing rock formations.

Bacteria: Fecal coliform bacteria are found in the digestive systems of warm blooded animals. In the environment coliform bacteria is an indicator of potential disease causing organisms. Potential sources of bacteria contamination in groundwater include livestock facilities, septic systems, pets, and wildlife. Many wells are impacted by bacteria due to improper construction which allows water from the surface to funnel directly into the well.

Ammonia: Ammonia is a chemical which is toxic to fish and aquatic organisms. Sources of ammonia are livestock, septic tanks, fertilizer, municipal and industrial waste.

TSS: TSS stands for Total Suspended Solids which are particles such as soil, algae, and finely divided plant material suspended in water. Sources of TSS are soil erosion from cropland, stream banks, or construction sites, and municipal and industrial waste.

VOCs: Volatile Organic Compounds, also called purgeable organics, are components of fuels and solvents. They are ingredients in many household and industrial products. Sources of VOCs are leaking fuel storage tanks, trash dumps, and some agricultural pesticides.

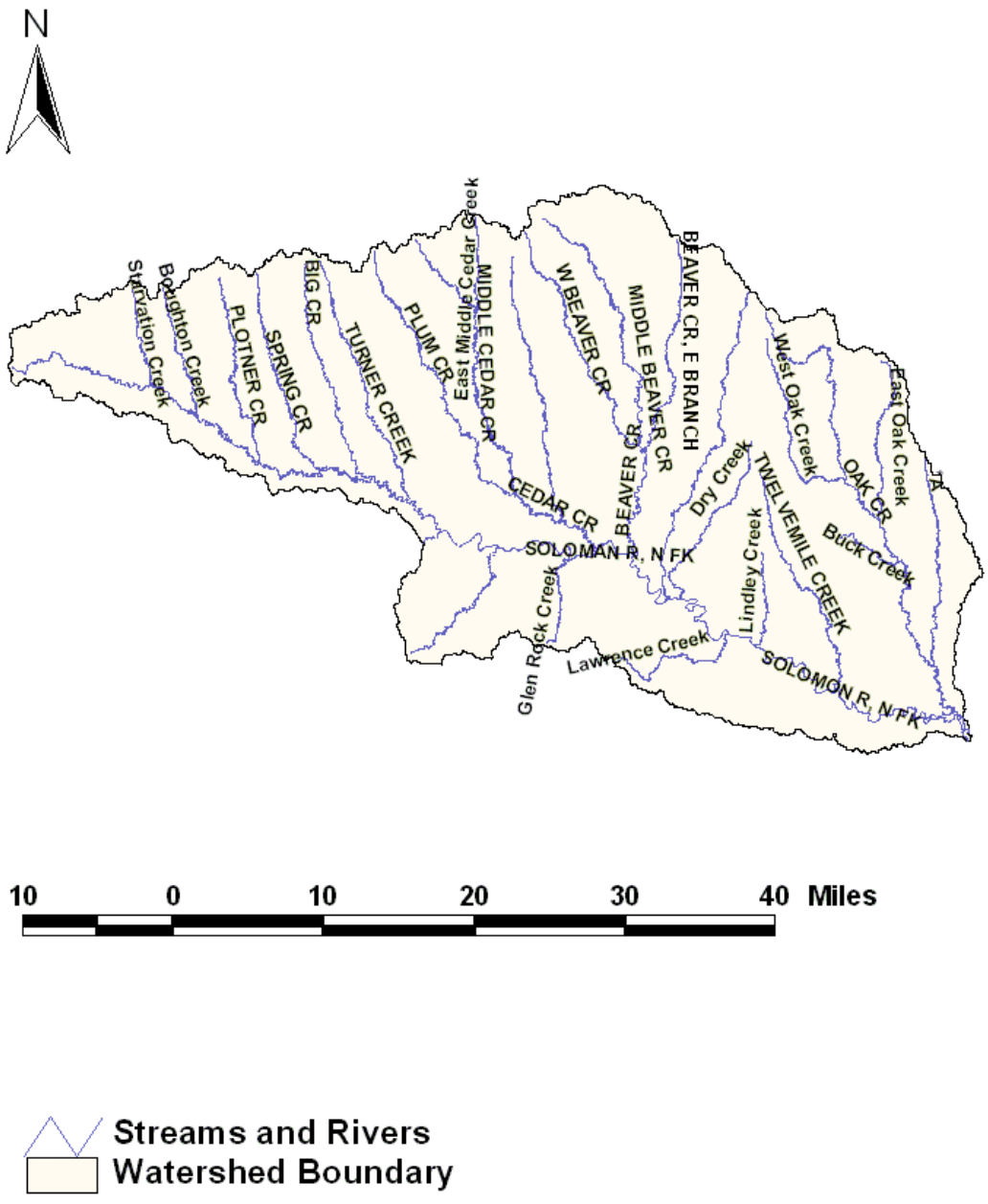
Iron: Iron is a naturally occurring element found in the soil throughout Kansas. It is an annoyance as it has an objectionable taste, causes a red stain to porcelain fixtures and laundry, and causes plumbing irritations.

Manganese: Manganese is a naturally occurring element and causes an unpleasant taste in drinking water, stains porcelain and laundry, and collects deposits in plumbing. It is naturally occurring throughout the soils in the state.

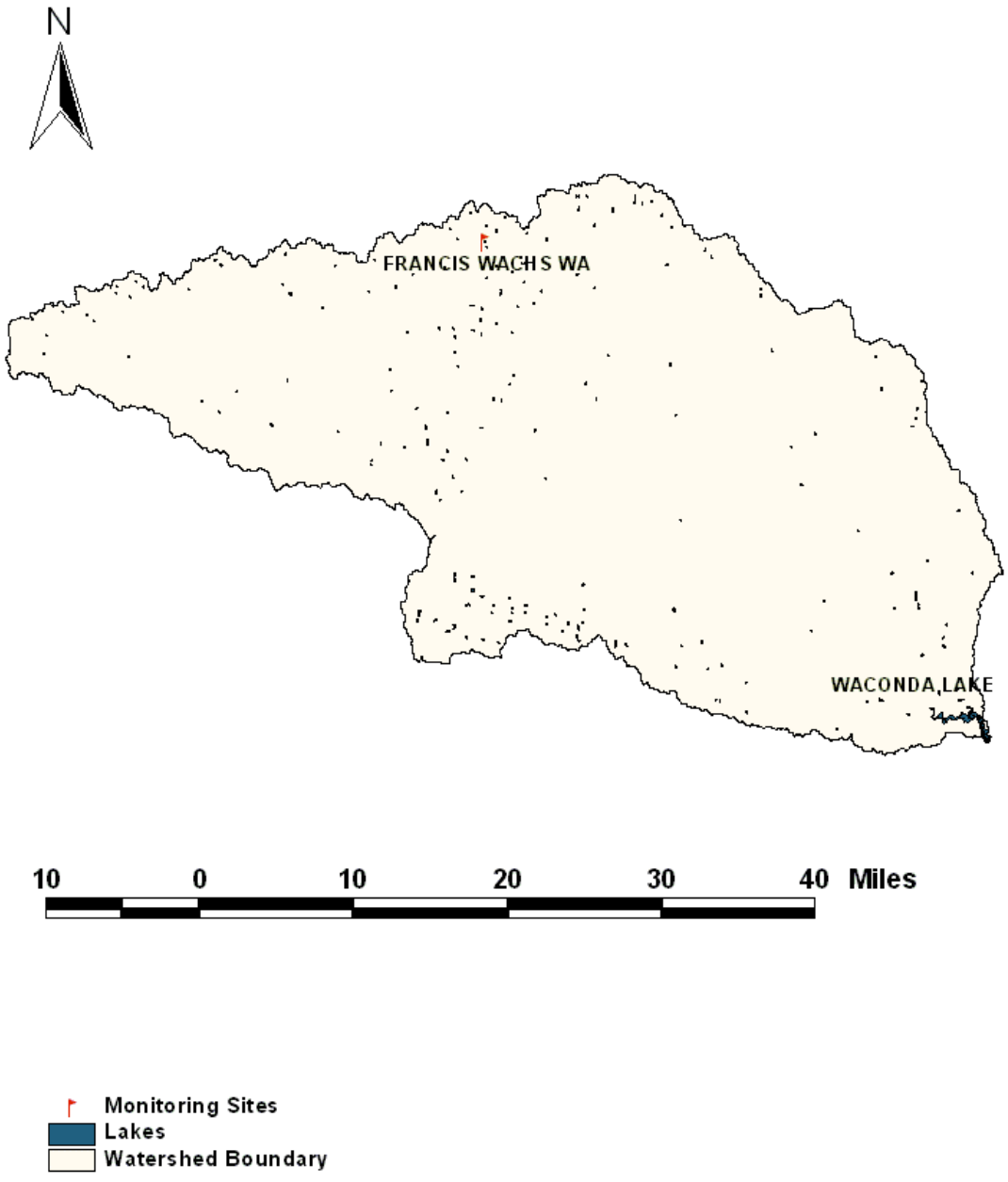
Attachments

Maps

Huc -10260012- Lower North Fork Solomon Streams and Rivers



Huc -10260012- Lower North Fork Solomon Lake Monitoring Sites



Huc -10260012- Lower North Fork Solomon Groundwater Aquifers